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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PHILIPPE ARMANGAU and MILENA BERGANT

Appeal 2008-2744
Application 10/603,411
Technology Center 2100

Decided: January 23, 2009

Before LANCE LEONARD BARRY, JAY P. LUCAS, and
ST. JOHN COURTENAY III, *Administrative Patent Judges*.

COURTENAY, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

This is a decision on appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 8, 9, 16-18, 33, 34, 41-43, 54, and 59-61. Claims 1-7, 10-15, 19-32, 35-40, 44-53, 55-58, and 62-66 have been cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

INVENTION

The invention on appeal is directed generally to data storage systems. More particularly, Appellants' invention is directed to a snapshot copy facility for a data storage system (Spec. 2).

ILLUSTRATIVE CLAIMS

Claims 8 and 9, which further illustrate the invention, follow:

8. A method of operating a snapshot copy facility that stores a plurality of snapshot copies of a production file system, each of the snapshot copies being a prior state of the production file system at a respective point in time, said method comprising:

the snapshot copy facility receiving a request for the difference between a specified older one of the snapshot copies and a specified younger one of the snapshot copies; and

the snapshot copy facility responding to the request by returning the difference between the specified older one of the snapshot copies and the specified younger one of the snapshot copies;

wherein the snapshot copy facility has an index for each snapshot copy for indicating changes between said each snapshot copy and a next snapshot copy of the production file system, and the method includes scanning the index for the specified older one of the snapshot copies,

which includes scanning the indices for a sequence of the snapshot copies including the index for the specified older one of the snapshot copies and a respective index for each of a plurality of snapshot copies of the production file system that are both younger than the specified older one snapshot copies and older than the specified younger one of the snapshot copies, and

wherein the indices for the sequence of the snapshot copies are scanned by a program routine having an outer loop indexing blocks of data in the file system, and an inner loop indexing the snapshot copies in the sequence of the snapshot copies.

9. A method of operating a snapshot copy facility that stores a plurality of snapshot copies of a production file system, each of the snapshot copies being a prior state of the production file system at a respective point in time, said method comprising:

the snapshot copy facility receiving a request for the difference between a specified older one of the snapshot copies and a specified younger one of the snapshot copies; and

the snapshot copy facility responding to the request by returning the difference between the specified older one of the snapshot copies and the specified younger one of the snapshot copies;

wherein the snapshot copy facility has an index for each snapshot copy for indicating blocks of data that are known to be invalid in said each snapshot copy, and the method includes scanning the index for the specified younger one of the snapshot copies, and when the index indicates that a block is not known to be invalid, then determining whether the block has changed between the specified older one of the snapshot copies and the specified younger one of the snapshot copies.

PRIOR ART

The Examiner relies upon the following references as evidence in support of the rejections:

Goldstein	US 2004/0163009 A1	Aug. 19, 2004
Ohran	US 2002/0112134 A1	Aug. 15, 2002

THE REJECTIONS

Claims 8, 33, and 54 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Goldstein.

Claims 9, 16-18, 34, 41-43, and 59-61 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Goldstein and Ohran.

APPELLANTS' CONTENTIONS

Regarding the Examiner's rejection of independent claims 8, 33, and 54, Appellants make the following principal contention:

Disclosure in Goldstein pertinent to appellants' claims 8, 33, and 54 is the generation of concatenated precedent lists for example as recited in Goldstein's claim 10 on page 6. The appellants' amendment to claims 8, 33, and 54 clearly define a scanning procedure including inner and outer loops that determine the blocks that have changed over a series of at least three successive snapshots. Instead of generating concatenated precedent snapshot difference lists between neighboring snapshots in a series by a process of repeated concatenation (e.g., indexing blocks in an inner loop and indexing snapshot copies in an outer loop), the appellants' claims define indexing the snapshot copies in an inner loop and indexing blocks in the outer loop. The appellants' claims call for a scanning procedure directly opposite to what Goldstein would suggest.

(App. Br. 27-28).

Regarding the Examiner's rejection of independent claims 9 and 34, Appellants contend, *inter alia*, that neither Goldstein nor Ohran scans an index for a specified younger one of the snapshot copies, such that the index indicates that a block is not known to be invalid, then determining whether the block has changed between the specified older one of the snapshot copies and the specified younger one of the snapshot copies (Reply Br. 2, ¶3, App. Br. 34; *see also* claim 9 and the equivalent language in claim 34).

Regarding the Examiner's rejection of independent claims 16, 41, and 59, Appellants contend, *inter alia*, that these claims are patentable over Goldstein and Ohran for the same reasons previously given regarding claims 8, 9, 33, and 34 (App. Br. 36).

Regarding the Examiner's rejection of independent claims 17, 42, and 60, Appellants contend, *inter alia*, that these claims are patentable over Goldstein and Ohran for the same reasons previously given regarding independent claim 9 (App. Br. 36-37).

EXAMINER'S RESPONSE

Regarding the anticipation rejection of independent claims 8, 33, and 54, the Examiner points to Goldstein's Figure 7 and the associated description in paragraphs [0042] and [0043] as purportedly teaching the claimed outer loop that indexes blocks of data in the file system, and an inner loop indexing the snapshot copies in the sequence of the snapshot copies (Ans. 15). The Examiner further reasons that "[i]t is clear, since the blocks are identified, that an index into the snapshot exists so that the blocks themselves can be identified for inclusion into the difference list." (Ans. 16).

Regarding the obviousness rejection of independent claims 9 and 34, the Examiner looks to the secondary Ohran reference for purportedly teaching an index indicating blocks of data that are known to be invalid (or valid), where an invalid designation (e.g., D_x) corresponds to the claimed “an index for indicating blocks of data that are known to be invalid” and a “valid” designation (e.g., D₁) corresponds to the claimed “index [that] indicates that a block is not known to be invalid (*see* claim 9; *see also* Ans. 10, 17; Ohran Figure 4; FF 7-8).

ISSUES

Based upon our review of the record, we have determined that the following issues are dispositive in this appeal:

ISSUE 1

Have Appellants shown error in the Examiner's finding that the Goldstein reference discloses scanning indices in the manner claimed?

ISSUE 2

Have Appellants shown error in the Examiner's finding that the combination of Goldstein and Ohran scans an index for a specified younger one of the snapshot copies, such that the index indicates that a block is not known to be invalid, and then determining whether the block has changed between the specified older one of the snapshot copies and the specified younger one of the snapshot copies?

PRINCIPLES OF LAW

In rejecting claims under 35 U.S.C. § 102, “[a] single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation.” *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1375-76 (Fed. Cir. 2005) (citation omitted). To anticipate, every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the claim. *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001); *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991).

FINDINGS OF FACT

In our analysis *infra*, we rely on the following findings of fact (FF) that are supported by a preponderance of the evidence:

THE GOLDSTEIN REFERENCE

1. Goldstein discloses that file recovery is best accomplished when a precedent physical incremental backup has been performed, such as illustrated in FIG. 7, where a base state snapshot difference list 141 (in state snapshots) is generated by identifying all segments of the base state snapshot 111 that are different from the first state snapshot 113. (¶ [0042]).
2. Goldstein discloses that a first precedent snapshot difference list 143 (in state snapshots) is generated and that all segments of the first state snapshot 113 that are different from the second state snapshot 115 are listed. (¶ [0043]).

3. Goldstein discloses that a first precedent backup 153 is made by copying from the first state snapshot 113 all the data blocks identified in the first precedent snapshot difference list 143 and by copying the first precedent snapshot difference list 143 (§ [0043]).
4. Goldstein discloses that the precedent physical incremental backup process is continued to obtain a second precedent snapshot difference list 145 and a second precedent backup 155, and a third precedent snapshot difference list 147, and a third precedent backup 157 in a similar manner.
5. Goldstein discloses that “[t]he snapshots 57 are compared by a processing unit 53, as explained in greater detail below, to produce a list of blocks that have changed between the snapshots 57 so that those blocks may be copied into backups 59.” (§ [0024]).

THE OHRAN REFERENCE

6. Ohran discloses “[a]t time $T_{1,2}$, a data corruption event occurs, resulting in data block 30c (D_x) being written to the data stored in the mass storage device. As used in this example, the subscripts “x” and “y” represent corrupted data. The data corruption can have substantially any cause, such as data entry problems, software problems, hardware problems, or the like.” (§ [0037]).
7. Ohran discloses: “[t]hus, the resulting data representing the state of the mass storage device at $T_{1,2}$ is (A_1 , B, C, D_x , E) 20c. Because data blocks 20c also include corrupted data block D_x , it is determined that the set of data blocks 20c represent corrupted data.” (§ [0044]).
8. Ohran discloses: “[a]t this point, it is determined that the data 20b (A_1 , B, C, D_1 , E) represents valid, non-corrupted data. Thus, the data

blocks of the preservation memory have been used to incrementally restore in reverse chronological order the data blocks of the mass storage device until such time that a valid set of data is obtained.” (¶ [0045]).

ANALYSIS

ISSUE 1

We decide the question whether Appellants have shown error in the Examiner's finding that the Goldstein reference discloses scanning indices in the manner claimed.

The Examiner has proffered that “[i]t is clear, since the blocks [Goldstein, Figure 7] are identified, that an index into the snapshot exists so that the blocks themselves can be identified for inclusion into the difference list.” (Ans. 16).

We begin our analysis by broadly but reasonably construing the claimed index. We begin by noting that an index is generally construed in the computing arts as a pointer or offset with respect to a base element of an array or list. However, we note that the index for each snapshot copy is defined in the equivalent language of claims 8, 33, and 54 as *indicating changes between each snapshot copy and a next snapshot copy*. While Goldstein discloses a plurality of snapshot difference lists (141, 143, 145, 147) that indicate changes between each snapshot copy and a next snapshot copy, these snapshot difference lists are *generated* (FF 2). Thus, if we consider Goldstein’s snapshot difference lists as corresponding to the claimed indices, we find that Goldstein’s plurality of snapshot difference

lists (141, 143, 145, 147, Figure 7) are *generated* instead of being *scanned* in the manner claimed by Appellants (claims 8, 33, and 54).

In the alternative, if we consider Goldstein's precedent backups (151, 153, 155, 157, Figure 7) as *indicating changes between each snapshot copy and a next snapshot copy*, we note that Goldstein discloses that a first precedent backup 153 is *made* by copying from the first state snapshot 113 all the data blocks identified in the first precedent snapshot difference list 143 and by copying the first precedent snapshot difference list 143 (FF 3). Thus, if we consider Goldstein's plurality of precedent backups as corresponding to the claimed indices, we find the portion of the reference pointed to by the Examiner indicates that Goldstein's plurality of precedent backups (151, 153, 155, 157, Figure 7) are *made* instead of being *scanned* in the manner claimed by Appellants (claims 8, 33, and 54).

The Examiner appears to have determined that the claimed indices and the claimed scanning of the indices are inherent features of Goldstein (Ans. 16). However, we find that to affirm the Examiner on this point would require speculation on our part. Our reviewing court has clearly stated that "[i]nherency ... may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, (Fed. Cir. 1999) (internal citations omitted).

Moreover, (as argued by Appellants), independent claim 8 requires scanning the indices for the sequence of the snapshot copies by a program routine having an outer loop indexing blocks of data in the file system, and an inner loop indexing the snapshot copies in the sequence of the snapshot copies (*see* equivalent language recited in independent claims 33 and 54).

We do not find, and the Examiner has not established, the scanning of *indices* (as opposed to merely scanning storage data) in the manner claimed. We note that “absence from the reference of any claimed element negates anticipation.” *Kloster Speedsteel AB v. Crucible, Inc.*, 793 F.2d 1565, 1571 (Fed. Cir. 1986). Therefore, based upon our review of the record before us, we find the weight of the evidence supports the Appellants’ position.

Because we conclude that Appellants have met their burden of showing that the Examiner has not established a *prima facie* case of anticipation, we reverse the Examiner’s rejection of independent claims 8, 33, and 54 as being anticipated by Goldstein.

ISSUE 2

We decide the question of whether Appellants have shown error in the Examiner's finding that the combination of Goldstein and Ohran scans an index for a specified younger one of the snapshot copies, such that the index indicates that a block is not known to be invalid, then determining whether the block has changed between the specified older one of the snapshot copies and the specified younger one of the snapshot copies (as required by the language of claim 9 and the equivalent language of claim 34).

For convenience, we reproduce the pertinent portion of independent claim 9 here:

wherein the snapshot copy facility has an index for each snapshot copy for indicating blocks of data that are known to be invalid in said each snapshot copy, and the method includes scanning the index for the specified younger one of the snapshot copies, and when the index indicates that a block is not known to be invalid, then

determining whether the block has changed between the specified older one of the snapshot copies and the specified younger one of the snapshot copies.

(Claim 9; *see* equivalent language in independent claim 34).

The Examiner points to Goldstein's teaching of comparing snapshots 57 to produce a list of blocks that have changed between the snapshots (Ans. 17; *see also* FF 5). The Examiner proffers that the blocks in Goldstein's list are valid blocks (i.e., not known to be invalid) (Ans. 17). The Examiner looks to the secondary Ohran reference for purportedly teaching an index indicating blocks of data that are known to be invalid (or valid), where an invalid designation (e.g., D_x) corresponds to the claimed "an index for indicating blocks of data that are known to be invalid" and a "valid" designation (e.g., D_1) corresponds to the claimed "index [that] indicates that a block is not known to be invalid (*see* claim 9; *see also* Ans. 10, 17; Ohran Figure 4; FF 7-8).

We note that Ohran discloses "[a]t time T_{12} , a data corruption event occurs, resulting in data block 30c (D_x) being written to the data stored in the mass storage device. As used in this example, the subscripts "x" and "y" represent corrupted data." (FF 6).

After considering the evidence before us, we agree with Appellants' contention that "[t]he fact that the subscripts 'x' and 'y' represent corrupted data as used in a patent specification (Ohran, page 4, paragraph [0037]) is not a disclosure of a snapshot copy facility having an index for each snapshot copy for indicating blocks of data that are known to be invalid in the snapshot copy." (Reply Br. 2).

Moreover, we find the Examiner's proffered combination does not fairly teach or suggest the claimed *causal* connection, such that "scanning the *index* for a specified younger one of the snapshot copies, and *when* the *index* indicates that a block is not known to be invalid, *then* determining whether the block has changed between the specified older one of the snapshot copies and the specified younger one of the snapshot copies." (Claim 9; *see* equivalent language in independent claim 34).

Because we conclude that Appellants have met their burden of showing that the Examiner has not established a *prima facie* case of obviousness, we reverse the Examiner's rejection of independent claims 9 and 34 as being unpatentable over the combination of Goldstein and Ohran.

Regarding the Examiner's rejection of independent claims 16, 41, and 59, we note that Appellants contend that these claims are patentable over Goldstein and Ohran for the same reasons previously given regarding claims 8, 9, 33, and 34 (App. Br. 36). Therefore, because claims 16, 41, and 59 recite equivalent limitations, we reverse the Examiner's rejection of independent claims 16, 41, and 59 as being unpatentable of the combination of Goldstein and Ohran for the same reasons discussed *supra* regarding claims 8, 9, 33, and 34.

Regarding the Examiner's rejection of independent claims 17, 42, and 60, we note that Appellants contend that these claims are patentable over Goldstein and Ohran for the same reasons previously given regarding independent claim 9 (App. Br. 36-37). Therefore, because claims 17, 42, and 60 recite equivalent limitations, we reverse the Examiner's rejection of independent claims 17, 42, and 60 as being unpatentable of the combination of Goldstein and Ohran for the same reasons discussed *supra* regarding

claim 9. Because claims 18, 43, and 61 depend upon independent claims 17, 42, and 60 respectively, we likewise reverse the Examiner's rejection of claims 18, 43, and 61 as being unpatentable of the combination of Goldstein and Ohran.

CONCLUSION OF LAW

Based on the findings of facts and analysis above, Appellants have established that the Examiner erred in rejecting claims 8, 33, and 54 under 35 U.S.C. § 102(e) for anticipation.

Based on the findings of facts and analysis above, Appellants have established that the Examiner erred in rejecting claims 9, 16-18, 34, 41-43, and 59-61 under 35 U.S.C. § 103(a) for obviousness.

DECISION

We reverse the Examiner's decision rejecting claims 8, 9, 16-18, 33, 34, 41-43, 54, and 59-61.

REVERSED

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